

What is claimed is:

1. A speed control and stall protection system for an electric DC brush motor, the system comprising:
 - a DC brush motor,
 - at least one relay connected between the motor and a power supply,
 - a speed sensing circuit constructed and arranged to generate a signal indicative of a speed of the motor, and
 - a motor control and protection circuit constructed and arranged to receive 1) the signal from the speed sensing circuit and 2) a control signal input for operating the at least one relay to control operation of the motor,

wherein, when a stall condition is determined based on the signal from the speed sensing circuit, the motor control and protection circuit is constructed and arranged to control the at least one relay to disconnect power to the motor.
2. The system of claim 1, wherein the motor is a single speed motor and one relay is provided, the motor control and protection circuit being constructed and arranged to receive the control signal input in the form of an on/off signal to control the relay and thus operation of the motor.
3. The system of claim 1, wherein the motor is a dual speed motor and a first relay is provided together with a series resistor for operating the motor at a low speed and second relay is provided for operating the motor at a speed greater than the low speed, the motor control and protection circuit being constructed and arranged to receive the control signal input in the form of a speed control signal to selectively activate the first and second relays to control speed of the motor, and to inactivate the first and second relays to disconnect power to the motor.

4. The system of claim 1, wherein the motor, the at least one relay, the speed sensing circuit and the motor control and protection circuit are part of a single module.
5. The system of claim 1, wherein the motor is a permanent magnet motor.
6. A speed control and stall protection system for an electric DC brush motor, the system comprising:
 - a DC brush motor,
 - at least one relay connected between the motor and a power supply,
 - means for generating a signal indicative of a speed of the motor, and
 - means for controlling speed and protecting the motor constructed and arranged to receive 1) the signal from the speed sensing circuit and 2) a control signal input for operating the at least one relay to control operation of the motor,
 - wherein, when a stall condition is determined based on the signal from the means for generating a signal indicative of a speed of the motor, the means for controlling speed and protecting the motor controls the at least one relay to disconnect power to the motor.
7. The system of claim 6, wherein the motor is a single speed motor and one relay is provided, the means for controlling speed and protecting the motor is constructed and arranged to receive the control signal input in the form of an on/off signal to control the relay and thus operation of the motor.
8. The system of claim 6, wherein the motor is a dual speed motor and a first relay is provided together with a series resistor for operating the motor at a low speed and second relay is provided for operating the motor at a speed greater than the low speed, the means for controlling speed and protecting the motor being constructed and arranged to receive the control signal input in the form of a speed control signal to selectively activate the first and second relays to control

speed of the motor and to inactivate the first and second relays to disconnect power to the motor.

9. The system of claim 6, wherein the motor, the at least one relay, the means for generating a signal and the means for controlling speed and protecting the motor are part of a single module.
10. A method of controlling speed and protecting during a stall condition, the method including the steps of:
 - providing a permanent magnet DC brush motor,
 - providing at least one relay connected between the motor and a power supply,
 - controlling the at least one relay to operate the motor,
 - determining a speed of the motor, and
 - comparing the determined speed of motor with a threshold value and if the determined speed is below the threshold value, controlling the at least one relay to disconnect power to the motor.
11. The method of claim 10, wherein the motor is a single speed motor and one relay is provided, the steps of controlling the relay includes sending an on/off signal to the relay.
12. The method of claim 10, wherein the motor is a dual speed motor and a first relay is provided together with a series resistor for operating the motor at a low speed and second relay is provided for operating the motor at a speed greater than the low speed, the step of controlling the at least one relay to operate the motor includes selectively activating the first and second relays to control the speed of the motor, and the step of controlling the at least one relay to disconnect power to the motor includes inactivating both the first and second relays.

13. The method of claim 12, wherein to operate the motor at a low speed, the first relay is activated and the second relay is inactivated and to operate the motor at a speed greater than the low speed, the first relay is inactivated and the second relay is activated.
14. The method of claim 12, wherein the step of controlling the at least one relay to control the motor includes operating the motor at the low speed for a certain period of time and then operating the motor at a speed greater than the low speed so as to allow lower inrush of motor currents.